VIDYASAGAR UNIVERSITY

Midnapore, West Bengal

PROPOSED CURRICULUM & SYLLABUS (DRAFT) OF

BACHELOR OF SCIENCE WITH ELECTRONICS

(MULTIDISCIPLINARY STUDIES)

3-YEAR UNDERGRADUATE PROGRAMME

(w.e.f. Academic Year 2023-2024)

Based on

Curriculum & Credit Framework for Undergraduate Programmes

(CCFUP), 2023 & NEP, 2020

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VIDYASAGAR UNIVERSITY
BACHELOR OF SCIENCE IN PHYSICAL SCIENCES with ELECTRONICS
(*under CCFUP, 2023*)

Level	YR.	SEM	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
								CA	ESE	TOTAL
B.Sc. in Physical Sc. with Electronics	1st	I	**SEMESTER-I**							
			Major (Disc.-A1)	ELCPMJ101	**T: Basics of Analog Circuits P: Practical** ***(To be studied by the students taken Electronics as Discipline-A)***	4	3-0-1	15	60	75
			SEC	SEC01	***To be chosen from SEC-01 of Discipline A/B/C of their Hons. prog.***	3	0-0-3	10	40	50
			AEC	AEC01	Communicative English-1 (***common for all programmes***)	2	2-0-0	10	40	50
			MDC	MDC01	Multidisciplinary Course-1 (***to be chosen from the list***)	3	3-0-0	10	40	50
			VAC	VAC01	VAC-01: ENVS (***common for all programmes***)	4	2-0-2	50	50	100
			Minor (Disc.-C1)	ELC MI 01/C1	**T: Analog Circuits; P: Practical** ***(To be studied by the students taken Electronics as Discipline-C)***	4	3-0-1	15	60	75
			Semester-I Total			20				400
		II	**SEMESTER-II**							
			Major (Disc.-B1)		***To be decided*** ***(Same as like A1 for students taken Electronics as Discipline-B)***	4	3-0-1	15	60	75
			SEC	SEC02	***To be chosen from SEC-02 of Discipline A/B/C of their Hons. prog.***	3	0-0-3	10	40	50
			AEC	AEC02	MIL-1 (***common for all programmes***)	2	2-0-0	10	40	50
			MDC	MDC02	Multi Disciplinary Course-02 (***to be chosen from the list***)	3	3-0-0	10	40	50
			VAC	VAC02	VAC-02 (***to be chosen from the list***)	4	4-0-0	10	40	50
			Minor (Disc.-C2)	ELC MI 02/C2	**T: Digital Circuits ; P: Practical** ***(To be studied by the students taken Electronics as Discipline-C)***	4	3-0-1	15	60	75
			Summer Intern.	CS	Community Service	4	0-0-4	-	-	50
			Semester-II Total			24				400
			TOTAL of YEAR-1			44	-	-	-	800

P MJ= Major Programme (Multidisciplinary), MI = Minor, A/B = Choice of Major Discipline; C= Choice of Minor Discipline; SEC = Skill Enhancement Course, AEC = Ability Enhancement Course, MDC = Multidisciplinary Course, VAC = Value Added Course; CA= Continuous Assessment, ESE= End Semester Examination, T = Theory, P= Practical, L-T-P = Lecture-Tutorial-Practical, MIL = Modern Indian Language, ENVS = Environmental Studies

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MAJOR (MJ)

MJ A1/B1: Basics of Analog Circuits **Credits 04 (FM: 75)**

MJ A1/B1T: Basics of Analog Circuits **Credits 03 [45L]**

Course contents:

Diode Circuits: Piece-wise linear characteristics of diode, dc load line analysis, Quiescent (Q) point. Clipping and clamping circuits. Rectifiers–DC power supply, Regulation, Filters.

Circuits using Bipolar Junction Transistor: Review of CE, CB Characteristics and regions of operation. Hybrid parameters model Transistor biasing, DC load line, operating point, thermal runaway, stability and stability factor. Transistor as a switch; Types of Amplifier, BJT in an amplifier circuit: Voltage and Power amplifier, Classes of amplifiers, BJT amplifiers.

Op-Amp: Differential Amplifier, Block diagram of Op-Amp, Characteristics of an Ideal and Practical Op-Amp, Open and closed loop configuration, Frequency Response, CMRR, Slew Rate and concept of Virtual Ground.

Applications of Op-Amps: Concept of feedback, negative and positive feedback, advantages of negative feedback (Qualitative Study). Inverting and non- inverting amplifiers, Summing and Difference Amplifier, Differentiator, Integrator, Comparator and Zero-crossing detector.

Feedback Amplifiers: Concept of feedback, negative and positive feedback, Types of feedback circuits Barkhausen criteria for oscillations, Oscillators; Regulated power supply: series and shunt (using BJT)

JFET–Types - p-channel and n-channel, working and I-V characteristics - n-channel JFET, parameters and their relationships, Comparison of BJT and JFET.

MOSFET Circuits: Review of Depletion and Enhancement MOSFET, Biasing of MOSFETs, Small Signal Parameters, Common Source amplifier circuit analysis, CMOS circuits.
Circuit diagram, Working and Frequency Response for each, Limitations of single tuned amplifier, Applications of tuned amplifiers in communication circuits.

MJ A1/B1P: Basics of Analog Circuits Lab (Practical) **Credits 01**

Course Outline

1. Study of the forward and reverse I-V Characteristics of a Diode.
2. Study of the input and output Characteristics of the of BJT .
3. Study of the I-V Characteristics of JFET.
4. Study of the half wave rectifier and Full wave rectifier.
5. Study of voltage regulator using Zener diode.
6. Designing of a Single Stage CE amplifier.
7. Designing of an amplifier of given gain for an inverting and non-inverting configuration using an op-amp.

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8. Study of the zero-crossing detector and comparator using OP-AMP.
9. Designing of analog adder and subtractor circuit.
10. Designing of an integrator using op-amp for a given specification and study its frequency response.
11. Designing of a differentiator using op-amp for a given specification and study its frequency response.
12. Study of a differential amplifier circuit using OP-AMP.

Reference Books:

1. Electronic Devices and circuit theory, Robert Boylstead and Louis Nashelsky,9thEdition, 2013, PHI
2. Electronic Devices, David A Bell, Reston Publishing Company
3. D.L.Schilling and C.Belove, Electronic Circuits :Discrete and Integrated, Tata McGraw Hill (2002)
4. DonaldA.Neamen, Electronic Circuit Analysis and Design, Tata McGrawHill (2002)
5. J.Millman and C.C.Halkias, Integrated Electronics, TataMcGraw Hill(2001)
6. J.J.Cathey,2000
7. Solved Problems in Electronics, Schaum' soutline Series, TataMcGraw Hill (1991)
8. Allen Mottershed, Electronic Devices and Circuits, Goodyear Publishing Corporation
9. Sedra Smith, Microelectronic Circuits, 6/E Oxford
10. Bogart Electronic Devices and Circuits,6ePearson

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MINOR (MI)

MI-1/C1: Same as Minor-1 (ELCMI01) of Electronics (Hons) programme — **Credits 04**, **Full Marks: 75**

MI-2/C2: Same as Minor-2 (ELCMI02) of Electronics (Hons) programme — **Credits 04**, **Full Marks: 75**

SKILL ENHANCEMENT COURSE (SEC)

TO BE CHOSEN FROM THE BUCKET OF SECs OF SELECTED DISCIPLINE A/B/C
(As per A/B/C Hons. Prog. Syllabus)

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